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Combining Pediocin (ALTA™ 2341) with Thermal Pasteurization for Control of *Listeria monocytogenes* on Frankfurters.

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Summary and Implications

Combining heat pasteurization after packaging with addition of pediocin (ALTA™ 2341) as an antimicrobial treatment for frankfurters was more effective than either treatment alone for reducing the number of contaminating *Listeria monocytogenes*. Heat treatments were most effective for single link packages, intermediate for 5-link packages and least effective for 10-link packages. Combining these treatments provides for improved control of contaminating *L. monocytogenes* on frankfurters and increases the safety of these products for consumers.

Introduction

Because *L. monocytogenes* outbreaks have resulted in several illness and deaths as well as massive product recalls, improved control of this organism is critical to the meat industry. Contamination of ready-to-eat (RTE) meats with *L. monocytogenes* occurs after cooking and before packaging. Consequently, treatments that are effective on products after the packages are sealed are sought by the industry. Two treatments that have been shown to be independently effective are pediocin application to product surfaces and heat pasteurization of packages after sealing. Combining these treatments was hypothesized to be potentially synergistic and consequently was investigated in this study.

Materials and Methods

Frankfurters for this study were manufactured, cooked and smoked, chilled and peeled prior to preparation for packaging treatments. The frankfurters were packaged as 1, 5 or 10 links per package, sprayed with pediocin (ALTA™ 2341), inoculated with a 5-strain mixture of *L. monocytogenes* and sealed under vacuum. Sealed packages were then pasteurized by heating in water at 71°C, 81°C or 96°C for up to 120 seconds. Following these treatments, packages were stored at 4°C, 10°C and 25°C. *L. monocytogenes* survivors were counted periodically during storage. Uninoculated, treated frankfurters were also

evaluated for quality changes including color, purge, texture, rancidity and sensory panel assessment.

Results and Discussion

The addition of pediocin (ALTA™ 2341) to inoculated frankfurters reduced the initial counts by 1.5 to 2.0 CFU/g, Heat pasteurization resulted in another 1.9 to 5.1 CFU/g reduction. In all cases, pediocin suppressed growth of survivors for about 7 weeks at 4°C, 2 weeks at 10°C and 1-2 days at 25°C. Results from storage of products at 10°C are shown in Figure 1. Heat pasteurization at 96°C for 120 seconds achieved virtually complete inactivation and essentially no growth in storage for single-link packages. The packaging arrangement resulted in different survival rates. While single-link packages showed no growth, 5-link and 10-link packages showed greater survival and subsequent growth, probably due to the link-to-link surface contact on the interior of the package that protected some *L. monocytogenes* from post-packaging pasteurization.

Quality assessments showed that product quality was essentially unaffected by the treatments. Consequently, pediocin combined with post-packaging heat pasteurization is a very effective means of controlling of *L. monocytogenes* on frankfurters, providing that the packaging arrangement is carefully considered.

Acknowledgement

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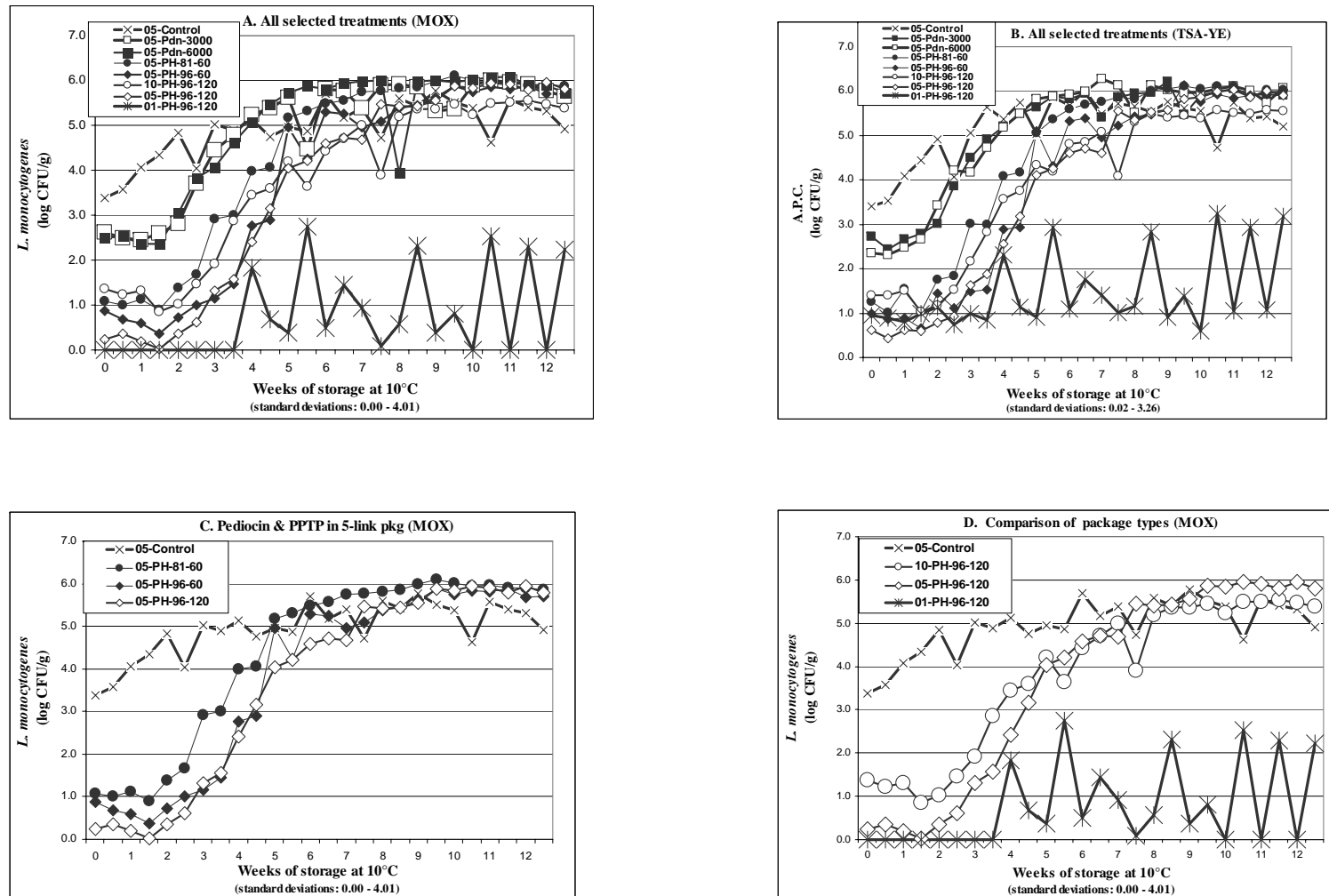


Figure 1. Survival and growth of *Listeria monocytogenes* (3.40 log CFU/g inoculation) and aerobic bacteria on the surface of frankfurters treated with pediocin (in ALTA™ 2341) combined with post-packaging thermal pasteurization (PTTP) and stored at 10°C; A. All selected treatments listed below (*L. monocytogenes* on MOX agar), B. All selected treatments listed below (aerobic bacteria [A.P.C.] on TSA-YE) C. Treatments for frankfurters heated at 81°C or 96°C for 60 s or 120 s in 5-link packages (*L. monocytogenes* on MOX agar), D. Frankfurters in 1-link, 5-link and 10-link packages heated at 96°C for 120 s (*L. monocytogenes* on MOX agar).